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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/674,571	09/30/2003	Dongzhi Jin	5319-12	3840

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EXAMINER	
AURORA, REENA	
ART UNIT	**PAPER NUMBER**
2862	

DATE MAILED: 08/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/674,571	JIN ET AL.	
	Examiner	Art Unit	
	Reena Aurora	2862	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1 - 20 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1 - 20 is/are rejected.

7)☒ Claim(s) 9 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 30 September 2003 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 09/30/03, 03/15/04.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claims 1 – 20 are presented for examination.

Claim Objections

Claim 9 is objected to because of the following informalities: the phrase "the neutral position" lacks antecedent basis. Appropriate correction is required

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1 – 20 are rejected under 35 U.S.C. 102(a) as being anticipated by Kin et al. (JP 2002-83535).

As to claim 1, Kin et al. (hereinafter Kin) discloses rotation sensor for detecting an angle of rotation wherein a rotor (2, fig. 1) mounted to the rotating member (shaft, fig. 1) for rotation together therewith, the rotor (2) having an annular element (2b); a magnetic coil/core unit (3, 3b sub 1) arranged opposite to the annular element (2b) and fixed to a fixing member (4), said magnetic coil/core unit (3, 3b sub 1) including a core body (3a), and an excitation coil (3b sub 1) for carrying an AC current and forming a magnetic circuit (Cmg, fig. 3) wherein the annular element (2b) having a width varying along a circumferential direction of the rotor (from p1 to p2, fig. 2) such that when the

rotor is rotated, the annular element (2b) causes impedance of the exciting coil (3b sub 1) to change in accordance with a rotation angle of the rotor (2); and a detection device (4, fig. 5) electrically connected to the exciting coil (3b sub 1), for measuring a rotation angle of the rotating member based on change in the impedance of the exciting coil (Note English translation copy of JP 2002-83535; page 2, para 0011, lines 4-7; para 0012 and page 3, para 0016 - 0017).

As to claim 2, Kin discloses that the width of the annular element (2b, fig. 1 and 2) gradually increases (p1 to p2) along a half-circumference of the rotor (2) and then gradually decreases (p2 to p1) along a remaining half-circumference of the rotor (2) such that the annular element has a minimum width (p1) and a maximum width (p2) (Note page2, para 0008).

As to claim 3, Kin discloses the magnetic coil/core unit (3, fig. 3) forms a magnetic circuit (Cmg) when the AC current (page 3, lines 4 - 8) is applied to the exciting coil (3b sub 1), the magnetic circuit extending from the core body (3) and passing through the annular element (2b) (page 2, para 0011, line 7 – para 0012).

As to claim 4, Kin discloses the annular element (2b) is made of an electrically conductive material and generates an eddy current therein, which causes the impedance of the exciting coil (3b sub 1) to change as the rotor (2) rotates (page 2, para 0008, 0009 and 0013).

As to claim 5, Kin further discloses that the annular element (2b) is made of a magnetic material and causes an air gap between the annular element (2b) and the

magnetic coil/core unit (3, 3b sub 1) to change as the rotor (2) rotates, to thereby change the impedance of the exciting coil (page 2, para 0009, 0010 and 0012).

As to claim 6, Kin discloses that the rotor (2b) is made of a magnetic material, and the magnetic coil/core unit (3) forms a magnetic circuit (Cmg, fig. 3) in cooperation with the rotor (2) when the AC current (3c) is applied to the exciting coil (3b sub 1), the magnetic circuit (Cmg) passing through the annular element (2b) (para 0011 - para 0012 and page 3, lines 1 - 8).

As to claim 7, Kin discloses the sensor further includes a yoke member (6a, fig. 1) arranged such that the rotor (2) is located between the yoke member (2) and the magnetic coil/core unit (3, 3b sub 1), and the coil/core unit (3, 3b sub 1) forms a magnetic circuit (Cmg, fig. 3) in cooperation with the yoke member (6a) when the AC current is applied to the exciting coil (3b sub 1), the magnetic circuit passing through the annular element (2b) (page 3, lines 4 - 10).

As to claim 8, Kin discloses that the sensor comprises a plurality of magnetic coil/core units (3b sub 1, 3b sub 2, 3b sub 3, 3b sub 4, fig. 2) arranged along the circumferential direction of the rotor (2) (page 17, para 0030).

As to claim 9, Kin discloses the plurality of magnetic coil/core units include a first magnetic coil/core unit (3b sub 1, fig. 2) which is located at a circumferential position of the rotor (2) where the annular element (2b) has the minimum width (p1), and a second magnetic coil/core unit (3b sub 2) which is located at a circumferential position of the rotor (2) where the annular element (2b) has the maximum width (p2) when the rotating member is located at the neutral position (para 0022, fig. 2), the first and second

magnetic coil/core units (3b sub 1, 3b sub 2) being separated from each other in a diametrical direction of the rotor (2), and the detection device (4, fig. 5) includes a first measurement section (4c1, fig. 5; 4 sub h1, fig. 10) for measuring the rotation angle of the rotor, based on a difference between changes of the impedances of the exciting coils of the first and second magnetic coil/core units when the impedance of the exciting coils have changed (fig. 5, 7 and 8; page 5, para 0028 - 0029).

As to claim 10, Kin discloses the plurality of magnetic coil/core units (3b sub 1 – 3b sub 4, fig. 2) further include a third magnetic coil/core unit (3b sub 3) arranged at a substantially intermediate position between the first (3b sub 1) and second (3b sub 2) magnetic coil/core units in the circumferential direction of the rotor (2), and the detection device (12, fig. 8) determines a rotating direction of the rotating member based on changes in the impedance of the exciting coil of the third magnetic coil/core unit (page 5, para 0030, 0032, fig. 8 and 9).

As to claim 11, Kin discloses the plurality of magnetic coil/core units (3b sub 1 – 3b sub 4, fig. 2) further include a fourth magnetic coil/core unit (3b sub 4) further include a fourth magnetic coil/core unit (3b sub 4) separated from the third magnetic coil/core unit (3b sub 3) in a diametrical direction of the rotor (2), and the detection device (14, fig. 10) further includes a second measurement section (4 sub h2) for measuring the rotation angle of the rotor (2), based on a difference between changes of the impedances of the exciting coils of the third (3b sub 3) and fourth (3b sub 4) magnetic coil/core units when the impedances of the exciting coils have changed, and a selecting

section for selectively outputting the rotation angle measured by the first (4 sub h1) or second measurement section (4 sub h2) (page 6, para 0035 and 0036).

As to claim 12, Kin discloses the magnetic coil/core unit includes a set of two magnetic coil/core units (3, 8) arranged both side of the rotor (2), respectively, the set having the core bodies (3, 6a, fig. 4) facing to each other with the annular element (2b) of the rotor therebetween.

As to claim 13, Kin discloses the annular element (2) including two annular elements (2a, 2b fig. 13) associated with the core bodies (3, 8) of the set, respectively.

As to claim 14, Kin discloses the rotor (2) includes an inner ring portion (9a, fig. 15) to be mounted to the rotating member and an outer ring portion (9c) connected to the inner ring portion (9a) through bridges (9b), the outer ring portion (9c) being formed as the annular element.

As to claim 15, Kin discloses the sensor comprises a plurality of sets each including the two magnetic coil/core units (32, 33, fig. 16), the sets being arranged along the circumferential direction of the rotor (31) (3b sub 1 – 3b sub 4, fig. 15).

As to claim 16, Kin discloses the rotor includes an inner ring portion (9a, fig. 15) to be mounted to the rotating member and an outer ring portion (9c) connected to the inner ring portion (9a) through bridges (9b), the outer ring portion (9c) being formed as said annular element.

As to claim 17, Kin discloses the width of the annular element (2b, fig. 1) gradually increases along a circumference of the rotor (2) such that the annular element

has a minimum width (2b, P1) and a maximum width (P2) at positions close to each other.

As to claim 18, Kin discloses the maximum width (P2) of the annular element (2b) is smaller than a diameter of the core body (3) (fig. 2).

As to claim 19, Kin discloses that the rotating member comprises a steering shaft for a motor vehicle (page 6, para 0038, lines 1 - 3), the steering shaft allowing torsional deformation thereof such that there is a relative rotation angle between opposite ends thereof, and the rotation sensor further comprises a sensing device (34, fig. 16) for detecting the relative rotation angle of the steering shaft (page 9, para 0046, page 10, para 0059).

As to claim 20, Kin discloses a rotation sensor and angle of rotation wherein arranging a magnetic coil/core unit (3, 3b sub 1) near a rotor (2) rotatable together with the rotating member (shaft), the magnetic coil/core unit having a core body (3) and an exciting coil (3b sub 1) for carrying an AC current (page 3, lines 4 - 8) and forming a magnetic circuit (Cmg, fig. 3), the rotor (2) having an annular element (2b) whose width varies along a circumferential direction of the rotor (from P1 to P2, fig. 2), the annular element (2b) causing impedance of the exciting coil (3b sub 1) to change in accordance with a rotation angle of the rotor; and measuring a rotation angle of the rotating member, based on change in the impedance of the exciting coil (Note page 2, para 0011, lines 4 – 7; para 0012 and page 3, para 0016 - 0017).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Reena Aurora whose telephone number is 571-272-2263. The examiner can normally be reached on Monday - Friday, 7:00 - 3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, E. Lefkowitz can be reached on 571-272-2180. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Reena Aurora
Examiner